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EXAMINER	
TIMORY, KABIR A	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/820,347	Applicant(s) HALL ET AL.	
	Examiner Kabir A. Timory	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *15 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 October 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1 and 5 have been considered but are moot in view of new ground(s) of rejection because of the amendment.

2. The objections to the drawings are corrected by the amendment. Therefore, the objections are withdrawn.

3. The objection to the abstract is corrected by the amendment. Therefore, the objection is withdrawn.

4. The objections to the claims 8 and 21 are NOT corrected by the amendment. Therefore, the objections to the claims are NOT withdrawn.

Claim Objections

5. Claim 8 is objected to because of the following informalities:

(1) Claim 8, lines 2 and 4: The term "**L**" should be defined in the claim. It is unclear to the examiner what value "**L**" acquires. The examiner is respectfully

requesting to define a value for **"L"** in the claims. For example **--where L is an integer equal and/or greater than one--**.

(2) Claim 21, lines 2 and 5: The term "**L**" should be defined in the claim. It is unclear to the examiner what value "**L**" acquires. The examiner is respectfully requesting to define a value for **"L"** in the claims. For example **--where L is an integer equal and/or greater than one--**.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 2, 4, 6-8, 13-15, 17, 19-21, and 26 rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al (US Pub. Number 2003/0043928).

Regarding claim 1:

As shown in figure 1, Ling et al. discloses a method to operate a digital signal receiver, comprising:

- detecting the occurrence of a symbol degrading event for a received signal (error detection is interpreted to be detecting the occurrence of a symbol degrading. Also channel interleaver provides diversity against path effects such as fading) (paragraph 0068, lines 1-3 and paragraph 0084, lines 1-4);
- inserting zero symbols into a received symbol stream in response to detection of the signal degrading event prior to de-interleaving the received signal (paragraph 0025, lines 9-18, paragraph 0029, lines 13-19); and
- error correction decoding the received symbol stream having the inserted zero symbols (figure 8, paragraph 0144, lines 1-6).

One of ordinary skill in the art would have clearly recognized that in a communication system, in order to combat channel/signal fading and degradation, zero insertion and interleaving methodology are used. As shown in 110 figure 1, Ling et al. discloses a channel Interleaver 116 and Puncturer 117 which is in the transmit part of the system. In paragraph 0025, Ling et al. clearly discloses that this method is used to combat fading. Therefore, in order to combat fading and signal degradation, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the same methodology in the receive part of the system. The system of figure 1, clearly illustrates that the de-puncturer 159 is located prior to the channel deinterleaver 160. Furthermore, Ling et al. discloses "erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data

sink 164". According to paragraph 0025, lines 9-18, it is obvious to one of ordinary skilled in the art that this method is used to combat fading and/or signal degradation.

Regarding claim 2:

Ling et al. further discloses where error correction decoding comprises operating a Reed-Solomon decoder (the system which has Reed-Solomon coder would also have a Reed-Solomon decoder) (paragraph 0068, lines 3-6).

Regarding claim 4:

Ling et al. further discloses where error correction decoding comprises operating a Turbo decoder (paragraph 0135, lines 4-5).

Regarding claim 6:

Ling et al. further discloses where inserting occurs after a Viterbi decoder (paragraph 0147, lines 1-3).

Regarding claim 7:

Ling et al. further discloses where error correction decoding comprises first de-interleaving the received symbol stream having the inserted zero symbols (figure 8, 160, paragraph 0029, lines 13-19).

Regarding claim 8:

Ling et al. further discloses where detecting comprises:

- estimating a signal to noise ratio (SNR) of a block of L contiguous received symbols, where L corresponds to the number of symbols;

  comparing the estimated SNR to a threshold SNR value (paragraph 0010, lines 6-9); and

- replacing L symbols with L zero symbols when the estimated SNR is less than the threshold SNR (paragraph 0025, lines 9-16).

Regarding claim 13:

Ling et al. further discloses where detecting uses information received from a transmitter that is indicative of a time when a deep fade occurs (figure 1, paragraph 0084, lines 1-4).

Regarding claim 14:

Ling et al. further discloses a digital signal receiver, comprising:

- circuitry for detecting the occurrence of a symbol degrading event for a received signal and (error detection is interpreted to be detecting the occurrence of a symbol degrading. Also channel interleaver provides diversity against path effects such as fading) (paragraph 0068, lines 1-3 and paragraph 0084, lines 1-4) for inserting zero symbols into a received symbol stream prior to de-interleaving the received signal (paragraph 0029, lines 13-19); and
- a decoder for decoding the received symbol stream having the inserted zero symbols (paragraph 0029, lines 13-19).

Regarding claim 15:

Ling et al. further discloses where the decoder comprises a Reed-Solomon decoder (the system which has Reed-Solomon coder would also have a Reed-Solomon decoder) (paragraph 0068, lines 3-6).

Regarding claim 17:

Ling et al. further discloses where the decoder comprises a Turbo decoder (paragraph 0135, lines 4-5).

Regarding claim 19:

Ling et al. further discloses where said circuit inserts the zero symbols after a Viterbi decoder (paragraph 0147, lines 1-3).

Regarding claim 20:

Ling et al. further discloses, further comprising a de-interleaver for de-interleaving the received symbol stream having the inserted zero symbols (figure 8, 160, paragraph 0029, lines 13-19).

Regarding claim 21:

Ling et al. further discloses where said circuit comprises:

- means for estimating a signal to noise ratio (SNR) of a block of L contiguous received symbols, where L corresponds to the number of symbols (paragraph 0010, lines 6-9);
- means for comparing the estimated SNR to a threshold SNR value (paragraph 0025, lines 9-16); and
- means for replacing L symbols with L zero symbols when the estimated SNR is less than the threshold SNR (paragraph 0025, lines 9-16).

Regarding claim 26:

Ling et al. further discloses where said circuit uses information received from a transmitter that is indicative of a time when a deep fade occurs (figure 1, paragraph 0084, lines 1-4).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. . Claims 3, 5, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Koetter et al. (Us Patent Number 6,634,007).

Regarding claim 3 and 16:

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where error correction decoding comprises operating a BCH decoder.

However, Koetter et al., in the same field of endeavor, teaches where error correction decoding comprises operating a BCH decoder (column 12, lines 27-32).

One of ordinary skill in the art would have clearly recognized that in order to correct multiple random errors, coding methodology such as BCH (Bose-Chaudhuri-Hocquenghem) coding is used. By using this technique, we can estimate the likelihoods of the symbols that were input to the communication channel. In order to estimate the likelihood of the received symbols, it would have been obvious to one ordinary skill in the art at the time the invention was made to use BCH coding methodology as taught by Koetter et al. in the soft decoding of Reed-Solomon codes.

Using BCH decoding techniques is advantageous because it will provide a sufficient method of soft-decision decoding and forward error-correction.

Regarding claim 5 and 18:

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where inserting occurs in conjunction with operating a BPSK bit metric calculator.

However, Koetter et al., in the same field of endeavor, teaches where inserting occurs in conjunction with operating a BPSK bit metric calculator (column 16, lines 66-67).

One of ordinary skill in the art would have clearly recognized that there are several modulation techniques such as Phase Shift Keying (PSK). Also in digital communication we can use BPSK (Binary Phase Shift Keying) modulation to modulate the phase of a reference signal. In BPSK, a finite number of phases are used. Each of these phases is assigned a unique pattern of Binary Bits. Usually, each phase encodes an equal number of bits. Each pattern of bits forms the Symbols that is represented by the particular phase. In order to modulate the received signal in digital format, it would have been obvious to one ordinary skill in the art at the time the invention was made to use BPSK modulation methodology as taught by Koetter et al. in the soft decoding of Reed-Solomon codes. It is advantageous to use BPSK modulation because BPSK is the simplest form of PSK. It uses two phases which are separated by 180 degrees. Also BPSK modulation is the most robust of all the PSKs modulation.

10. Claims 9-12 and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Slack et al. (Us Patent Number 4,574,252).

Regarding claim 9 and 22:

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where detecting comprises examining the output of at least one Automatic Gain Control (AGC) circuit.

However, Slack et al., in the same field of endeavor, teaches, where detecting comprises examining the output of at least one Automatic Gain Control (AGC) circuit (figure 1, abstract, lines 1-6).

One of ordinary skill in the art would have clearly recognized Receivers for mobile communication systems include Automatic Gain Control (AGC) subsystems, which attempt to minimize the fluctuations in the received signal energy and consequently amplitude. In order to accomplish an approximately constant received signal energy, it would have been obvious to one ordinary skill in the art at the time the invention was made to include a AGC circuit in the system as taught by Slack et al. To adjust the signal power level, it is advantageous to use an Automatic Gain Control subsystem to achieve the appropriate power level in the received signal.

Regarding claim 10 and 23:

Ling et al. further discloses means for replacing symbols with zero symbols when either the first or the second threshold is exceeded (paragraph 0029, lines 13-19).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where said circuit comprises means for comparing the output of a slow AGC to a first threshold, means for comparing the output of a fast AGC to a second threshold.

However, Slack et al., in the same field of endeavor, teaches, where said circuit comprises means for comparing the output of a slow AGC to a first threshold, means for comparing the output of a fast AGC to a second threshold (figure 1, 20, 26, 34, 36).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. There are two types of degradation and fading: fast fading and slow fading. To control and adjust the signal power or amplitude level during these two fading conditions, it would have been obvious to one ordinary skill in the art at the time the invention was made to include AGC circuits to combat both fading conditions (fast and slow) as taught by Slack et al. To adjust the signal power level, it is advantageous to use an Automatic Gain Control subsystems to achieve the appropriate power level in the received signal in both fast and slow fading conditions.

Regarding claim 11 and 24:

Ling et al. further discloses means for replacing symbols with zero symbols when the difference exceeds the threshold (paragraph 0029, lines 13-19).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where said circuit comprises means for comparing a difference between the output of a slow AGC and the output of a fast AGC to a threshold.

However, Slack et al., in the same field of endeavor, teaches, where said circuit comprises means for comparing a difference between the output of a slow AGC and the output of a fast AGC to a threshold (figure 1, 20, 26, 34, 36, column 3, lines 58-64).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. There are two types of degradation and fading: fast fading and slow fading. To control and adjust the signal power or amplitude level during these two fading conditions, it would have been obvious to one ordinary skill in the art at the time the invention was made to include AGC circuits to combat both fading conditions (fast and slow) as taught by Slack et al. To adjust the signal power level, it is advantageous to use an Automatic Gain Control subsystems to achieve the appropriate power level in the received signal in both fast and slow fading conditions.

Regarding claim 12 and 25:

Ling et al. further discloses means for replacing symbols with zero symbols when the difference exceeds the threshold (paragraph 0029, lines 13-19).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where said circuit comprises means for comparing a difference between the output of a fast AGC and an average of the output of the fast AGC to a threshold.

However, Slack et al., in the same field of endeavor, teaches, where said circuit comprises means for comparing a difference between the output of a fast AGC and an

average of the output of the fast AGC to a threshold (figure 1, 20, 26, 34, 36, column 3, lines 58-64).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. There are two types of degradation and fading: fast fading and slow fading. To control and adjust the signal power or amplitude level during these two fading conditions, it would have been obvious to one ordinary skill in the art at the time the invention was made to include AGC circuits to combat both fading conditions (fast and slow) as taught by Slack et al. To adjust the signal power level, it is advantageous to use an Automatic Gain Control subsystems to achieve the appropriate power level in the received signal in both fast and slow fading conditions.

11. Claims 27- 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Rogards et al. (Us Patent Number 4,718,066).

Regarding claim 27:

Ling et al. further disclose

- in response to detecting the occurrence of the fading condition, inserting zero symbols into a received symbol stream at the receiver (error detection is interpreted to be detecting the occurrence of a symbol degrading. Also channel interleaver

provides diversity against path effects such as fading) (paragraph 0068, lines 1-3 and paragraph 0084, lines 1-4);

- de-interleaving (figure 1, 160) the received symbol stream having the inserted zero symbols signal (paragraph 0029, lines 13-19); and
- decoding (figure 1, 162) the received symbol stream having the inserted zero symbols (Erasures have zero value indicatives) (figure 1,159).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, detecting the occurrence of a fading condition due to obstruction by the propeller blade.

However, Rogards et al., in the same field of endeavor, teaches, detecting the occurrence of a fading condition due to obstruction by the propeller blade (periodic fading is interpreted to be a fading condition due to obstruction by the propeller blade) (figure 3, column 1, lines 22-34).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. Due to multipath phenomenon, in a communication system such as satellite radio waves experience phase and amplitude shifts. Also, small shifts in the transmission path could change the phase relationship of signals, causing periodic fading and produce bits or burst errors. To combat the signal fading, it would have been obvious to one ordinary skill in the art at the time the invention was made to design the system such that to be suitable for transmission of data frequently effected by periods of fading as taught by Rogards et al. To combat periodic fading, interleaving techniques

are used. These techniques enable the reduction or elimination of the correlation between the errors, which affect the successive symbols applied to a decoder, particularly by transmitting the different components of a block in an order different from that which the decoder will receive. These interleaving techniques have the disadvantage of increasing further the transmission time.

Regarding claim 28:

Ling et al. further disclose, where decoding comprises operating a concatenated forward error correction (FEC) decoder (figure 1, 162, paragraph 0067, lines 3-5).

Regarding claim 29:

Ling et al. further disclose, where decoding comprises operating one of a Reed-Solomon decoder, a BCH decoder, or a Turbo decoder (paragraph 0135, lines 4-5).

Regarding claim 30:

Ling et al. further disclose

- in response to detecting the occurrence of the fading condition, inserting zero symbols into a received symbol stream at the satellite (paragraph 0029, lines 13-19);
- de-interleaving (figure 1, 160) the received symbol stream having the inserted zero symbols (paragraph 0029, lines 13-19); and
- error correction decoding (figure 1, 162) the received symbol stream having the inserted zero symbols (Erasures have zero value indicatives) (figure 1,159).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, detecting, on the satellite, the occurrence of a fading condition due to obstruction by the propeller blade.

However, Rogards et al., in the same field of endeavor, teaches, detecting, on the satellite, the occurrence of a fading condition due to obstruction by the propeller blade (periodic fading is interpreted to be a fading condition due to obstruction by the propeller blade) (figure 3, column 1, lines 22-34).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. Due to multipath phenomenon, in a communication system such as satellite radio waves experience phase and amplitude shifts. Also, small shifts in the transmission path could change the phase relationship of signals, causing periodic fading and produce bits or burst errors. To combat the signal fading, it would have been obvious to one ordinary skill in the art at the time the invention was made to design the system such that to be suitable for transmission of data frequently effected by periods of fading as taught by Rogards et al. To combat periodic fading, interleaving techniques are used. These techniques enable the reduction or elimination of the correlation between the errors, which affect the successive symbols applied to a decoder, particularly by transmitting the different components of a block in an order different from that which the decoder will receive. These interleaving techniques have the disadvantage of increasing further the transmission time.

Regarding claim 31:

Ling et al. further disclose:

- inserting zero symbols into a received symbol stream (paragraph 0068, lines 1-3 and paragraph 0084, lines 1-4); and

- an error correction decoder (figure 1, 162) for decoding the received symbol stream having the inserted zero symbols (Erasures have zero value indicatives) (figure 1,159).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, a satellite, comprising a receiver for receiving a signal that passes through a channel that is periodically obstructed, the receiver comprising circuitry for detecting the occurrence of a fading condition due to an obstruction and, in response to detecting the occurrence of the fading condition.

However, Rogards et al., in the same field of endeavor, teaches a satellite, comprising a receiver for receiving a signal that passes through a channel that is periodically obstructed, the receiver comprising circuitry for detecting the occurrence of a fading condition due to an obstruction and, in response to detecting the occurrence of the fading condition (column 1, lines 22-34).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. Due to multipath phenomenon, in a communication system such as satellite radio waves experience phase and amplitude shifts. Also, small shifts in the transmission path could change the phase relationship of signals, causing periodic fading and produce bits or burst errors. To combat the signal fading, it would have been obvious to one ordinary skill in the art at the time the invention was made to design the system such that to be suitable for transmission of data frequently effected by periods of fading as taught by Rogards et al. To combat periodic fading, interleaving techniques

are used. These techniques enable the reduction or elimination of the correlation between the errors, which affect the successive symbols applied to a decoder, particularly by transmitting the different components of a block in an order different from that which the decoder will receive. These interleaving techniques have the disadvantage of increasing further the transmission time.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kabir A. Timory whose telephone number is 571-270-1674. The examiner can normally be reached on 6:30 AM - 3:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kabir A. Timory
January 04, 2008

Shuwang Liu

SHUWANG LIU
SUPERVISORY PATENT EXAMINER